STATE OF ALASKA GEOGRAPHIC INFORMATION ADVISORY COMMITTEE

Geographic Information System Strategic Plan

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Geographic Information Systems for Alaska

Geography brings us together

The Geographic Information Advisory Council (GIAC) is a subcommittee of the Telecommunication Information Council (TIC) headed by the Lt. Governor, Fran Ulmer. The GIAC will make recommendations to the TIC regarding policies and priorities relative to geographic information, which may benefit the state as a whole.

Mission

The mission of the GIAC is to recommend policies and procedures that will improve the quality, compatibility, and online accessibility of state government spatial information.

Goals

- Avoid redundant data collection
- Provide a forum for the exchange of ideas and information among agencies developing GIS
- Promote sharing of Geographic Information between government agencies, other organizations and the public
- Enhance decision making processes for agencies using GIS
- Promote educational opportunities to enhance awareness of geography, maps, and information systems and its usefulness in government decision making
- Promote compatibility through standards
- Maximize the state's investment in technology and data
- Promote the ability for individuals to browse existing information, determine if it will work for them, and to use it easily and efficiently.

These goals are categorized into three primary groups:

- Data Issues
- Application Issues
- Administrative & Logistical Issues

Overview

Geographic Information Systems (GIS) use computer hardware and software to help people make better decisions in a host of areas, such as resource management, environmental monitoring, and emergency response. GIS can display and communicate quantities of data covering a large geographic area in an easy-to-understand way, which enhances decision-making processes. It can help businesses streamline customer service operations, coordinate enterprise-wide problem solving, and significantly impact logistical planning. GIS can increase productivity, efficiencies, and lead to better decision making.

There are three audiences for GIS, which have distinct yet sometimes overlapping needs: the public, government decision-makers, and GIS analysts. The first two are typically data and application users, while the latter are typically data providers and application developers.

The ultimate goal is to develop GIS that meets the needs of government decision-makers and the public. In order for GIS to be successful, the needs of users must be thoroughly understood and a supporting infrastructure must be in place. With its broad collection of representative agencies, the GIAC can promote sound GIS practices, which will help the State GIS community meet users' needs.

Data Issues

Building the fundamental information for good decision making

The Alaska Geographic Data Committee (AGDC) has initiated efforts within Alaska to inventory and standardize GIS data. The AGDC is composed of representatives from a variety of federal and state agencies as well as representatives from the private sector and municipalities. Its efforts are focused on base map themes, such as bathymetry, cadastral, elevation models, orthoimagery, hydrography, vegetation, geology, soils, and wetlands. The AGDC provides two main functions. It acts as a clearinghouse, allowing others to search and retrieve GIS information. Secondly, it acts as a framework by determining the content of what should be included in specific datasets and how it should be contained.

The "clearinghouse" is a web site that contains metadata records. Metadata is documentation about your data, maps, or documents. It does not necessarily contain the actual data, map or document, but tells the user how to access it and provides more specifics on the contents and characteristics of the data. Metadata can simply be a readme.txt file or a piece of paper in a folder. This type of documentation is difficult to search, however. The Federal Geographic Data Committee (FGDC) developed a content standard for metadata. That is, the FGDC selected a list of fields that could address everyone's needs in documentation and standardized the naming convention and order for those fields. Not all fields have to be used, but a minimum is needed in order to make the record searchable.

Define expectations of GIS data and data documentation

The GIAC will provide a forum for the discussion and development of documentation standards, protocols, and policies that facilitate the exchange and utilization of data and information, promote application development, and increase efficiency and the value of the State's investment in technology and data.

Task 1: Review the Federal Executive Order

(See: http://www.fgdc.gov/publications/documents/geninfo/execord.html)

Task 2: Accept a metadata standard; populate existing clearinghouse or establish additional clearinghouse nodes.

Metadata Standard:

What is Metadata?
Metadata is documentation about data, maps, literature, etc. In this context, we are referring to the documentation about digital geographic data and maps. Most discussions have revolved around what data we have, how to get it, and how good is it. These are the fundamentals for metadata. It is apparent there is a need for metadata.

The Federal Geographic Data Committee (FGDC) has established a set of metadata standards. These standards allow a person to document as much or as little as he or she knows about a particular dataset. A minimum number of fields are required if the metadata is to be used for searching on any of the FGDC gateways. All federal agencies have been asked to implement the FGDC standards.

Why adopt the FGDC Standard?
The FGDC standards contain a field for just about anything one can think of, but not all of the fields are required or applicable. Having a standard allows one to search for information needed. Using the FGDC standards provide for compatibility with our federal counterparts and minimizes the need for custom application development to reach the State's goal. The FGDC standards are being used worldwide, and, as such, software applications for creating metadata are being developed to make this easier. Classes are often offered using this standard.

What data should have metadata?
Developing full FGDC compliant metadata isn't appropriate for everything. It is most appropriate for any data that is often used or shared, such as anadromous streams, centerlines of roads, land status, hazardous waste sites, crime locations, etc. Data that is created for temporary purposes or older, less used datasets, would benefit from having some kind of documentation, such as a "readme.txt" file or a minimum FGDC record, but would be less important.

Task 3: Develop Framework Content Standards for non-FGDC datasets

There are three issues to be addressed:

- Make data easier to maintain
- Make data more "off the shelf" ready for other applications
- Stay current on database development

The FGDC has established a framework, which provides content standards for particular base map themes. These standards encompass many possibilities for fields for a particular theme and the most appropriate fields can be utilized. These standards develop a unique ID system that allows users to ensure consistent reference to geographic features. These standards facilitate the integration of data, the creation of maps, analysis and the development of applications.

The State maintains data that addresses specific topics such as biological habitats, recreation, archaeology, subsistence, leasing and hazardous areas. These themes are beneficial in multi-agency initiatives, such as coastal management, area plans, oil spill planning, or emergency response but may be difficult to locate and integrate. Most of the state's GIS staff work on a project by project basis. As such, data is stored in project files and is seldom consistent from one project to another. Data is not typically "cleaned-up" and made easily available to other users often due to a lack of time and funding.

More recently, the GIS software vendors are changing their data model to be more "open" and permit the use of traditional relational databases for storing spatial data. This model simplifies the geographic features into points, lines and polygons, but builds in the relationship between these features using a relational database. This allows various software applications, both GIS as well as non-GIS applications, to read the same data, improves the speed of reading the data, and allows data to be stored, shared, and accessed over the web. For some particular themes, such as transportation or regulated facilities, standards are being established to determine the relational database, or geodatabase. Those who deal with this information on a regular basis may benefit from the data design developed by others. The state needs to stay current on changes in technology and data structure.

Task 4: Develop an operating procedure for handling GIS information for public access

A set of standard procedures for completing GIS data projects and making the resulting data and maps accessible would facilitate public and agency access.

Action items for data issues:

- Adopt a metadata standard
- Consider a similar administrative order as the Federal Government executive order (see: http://www.fgdc.gov/publications/documents/geninfo/execord.html) Include a sunset policy to ensure the order is effective in reaching goals.
- Set a schedule of when data will be documented
- Set training programs, as necessary, to fulfill this requirement.
- Hold data specific workshops to develop content standards. Follow up on them.
- Develop standard operating procedures for handing data and making it accessible.

Increase participation in the AGDC

The AGDC does not address specific datasets, such as biological habitats, recreation, archeology, subsistence, leasing, and hazardous areas. Statewide support for development of these themes will benefit many multi-agency initiatives, such as coastal management, area plans, oil spill plans, or emergency response. The infrastructure is in place to supplement the data served by AGDC. State leadership in developing topical themes will benefit state agencies, as well as other user groups.

The State of Alaska will address three main data issues:

- State representative participation in the AGDC is considerably less than the federal counterparts. In AGDC Subcommittees, there may only be one or two people representing the state and in some cases, none. As a result, State issues may not be addressed.

- Many of the resources the state is responsible for do not fall into the current subcommittee categories. As a result, data issues for non-base map data are not being addressed.

- There is no mandate within state government to comply with any type of data standards or procedures. As a result, it is difficult to get a statewide view of our resources and responsibilities, and to share the information. Current exchanges are based on voluntary efforts.

Short-term Goals are:

- Increase participation in the AGDC
- Develop consistent statewide themes of the state's resources
- Develop an Administrative Order, parallel or compatible to the Federal Executive Order, that states the expectations for GIS data

Tasks:

- Identify volunteers to represent the state on various AGDC Subcommittees.
- GIAC members should attend the larger AGDC meetings (held about three times a year).

Develop a list of consistent statewide themes of the state's resources

Task 1: While documentation of data may answer many of the questions concerning who has what data, the compilation of a simple list will provide a quick snapshot of those entities responsible for particular themes at the state level, the condition of the data, and other information determined to be appropriate. The list should also indicate the extent and status of any datasets that are stored in tabular or non-GIS form that could be converted to GIS data themes. This information will help prioritize datasets that need to be automated or updated.

THEME	RESPONSIBLE DEPARTMENT	STATUS & EXTENT
Detailed Land Status (Multi-layered theme)	Natural Resources Contact: Duncan Purvis	Detailed land status is maintained in tabular format in the Land Administrative System (LAS) as well as GIS format. Graphic interpretation of these records is maintained on the state status plats. The state status plats are currently being automated in Arc/Info at a township by township basis. The plat records are maintained on the Internet in PDF format.
Anadromous Streams	Fish & Game Contact: Ed Weiss	Anadromous fish streams are inventoried and specified by the ADF&G as part of the departments AS 16.05.870 responsibilities. Data has historically been transferred to USGS 1:63,360 scale maps and upper and lower point data stored in the AWC GIS database. Currently the ADF&G is transferring all AWC data from paper maps to the GIS environment. Data includes statewide point and arc layers in Albers projection. Attributes include the unique anadromous streams catalog number, type of fish, life stages and latitude, longitude and legal descriptions for the streams listed in the AWC.
Animal Habitat (Brown Bears)	Fish & Game Contact: Carol Barnhill	Habitat of brown bears is in hard copy format from the 1980's. Some of these boundaries have been automated.
Statewide Transportation	Transportation and Public Facilities Contact: Kerry Kirkpatrick	Detailed information regarding road conditions and types are maintained in tabular format in the (HAS). Currently roads are being GPSed by DOT. This data needs considerable hands on attention to ensure its accuracy.
Coastal Zone Boundary	Division of Governmental Coordination; Contact: Chas Dense Community and Economic Development; Contact: George Plumley	Digitized data from 1:250,000 maps originally developed by ADF&G. Boundary amendments require State and federal approval. Currently, data requires updating for Northwest Arctic Borough.

The list should be kept simple and easily obtainable. A more specific checklist of the status may be helpful. Some suggestions for this checklist are:

- Name of theme
- Agency Mandate
- Extent of Coverage
- Electronic format
- Metadata completed (if not, provide contact and schedule of completion)
- Available via Internet or CD ROM

Action Items:

- Each Department identifies the themes it is responsible for
- The GIAC will cross check this list to ensure there is mutual agreement regarding responsibility
- Develop a simple check list for basic status information needed
- Each Department completes the check list for each theme by a given deadline (TBA)

Task 2: Identify other themes that are needed, prioritize these themes, and develop a strategy for meeting these needs.

As a long-term goal, individuals want to be able to browse existing information, determine if it will work for them, and be able to use it easily and efficiently. The Internet provides a viable means for accomplishing this. Application developers or those who use standard products would like to have some confidence the data will be updated, and the data format will remain somewhat consistent.

Application Issues

Building the infrastructure of our future

The development of documentation standards and data standards provides the groundwork for application development. Traditionally, GIS data has been "manually" manipulated using basic GIS software packages to create a map or series of maps. Today's demands for GIS require incorporation into the standard business model to improve processes and increase efficiency, increase data accessibility and bring the power of GIS to the non-expert user.

The Internet map server site is one area of application development that will permit a user to select an area, the data of interest, and other parameters, and perform a variety of functions such as print a map, download the data, or answer some basic questions such as "how many acres of national park land border native allotments?"

Many government agencies are developing such applications, which will serve whatever individual needs these agencies may have. As a result, there may very well be duplication of capabilities, different user-interfaces (which may confuse end-users), and possibly incompatibility among services. Application development is a complex task. It may require a variety of programming tools, the skills of software engineers, analyst/programmers, and enterprise database administrators, and financial support.

By promoting the sharing of ideas and the exchange of information regarding current and upcoming GIS application development projects, these various agencies can maximize their GIS efforts through cooperation and learn from one another's experiences. The GIAC will promote opportunities for government agencies to share information concerning current application development and plans for future development. One means for doing this may be to sponsor meetings, which facilitate discussions concerning application development issues.

How much the GIAC should be involved in application-development may be a topic for discussion. Creating applications can be expensive. Adding more protocols can make it very expensive. The GIAC, should be aware of applications being developed and the issues that arise.

Commercial Software Development

Many state agencies use ESRI products. Other software products currently used include AutoCAD, ERDAS, Integraph, MapInfo or some other graphic software. The GIAC will provide a forum for the discussion of attributes of various software products and solutions.

Suggestions:

- Develop a database of projects involving application development at a larger scale. Develop a place where applications can be "registered." Have a coordinator look at these applications and identify topics for GIAC discussion.
- Facilitate the discussion on issues concerning application development. Encourage members to share ideas and collaborate.
- Ensure end-users and managers are involved with the application development.
- Research emerging technologies and determine appropriateness for applications within Alaska and state government.
- Support the necessary training for GIS professionals.

Administrative and Logistical Issues

Making it happen

The GIAC can help put all the pieces together. By developing a consistent infrastructure that supports the GIS analyst, user, and managers, Alaska can take full advantage of its investment in data and technology. The first few steps have been taken: This committee

was formalized and representatives from most of the Departments are present. Representatives with technical backgrounds as well as administrative backgrounds are represented.

Other administrative and logistical issues need to be addressed. Thus far in this document, we have identified:

- The review of the US Federal Executive Order.
- The development of documentation standards and procedures.
- Promote the quality of GIS application development.

The GIS Analyst Job Description

Unfortunately, the skills required in application development and GIS positions are also in very high demand and government agencies typically find it difficult to recruit and retain these individuals for a number of reasons, including low pay, poor training opportunities, improper work environment, and frustration due to lack of necessary resources. While it may be tempting to take the position, "we can just contract out application development or a particular data processing task," such a position may compromise the State's ability to provide a return on its investment in GIS data.

Currently GIS professionals can be considered cartographers, analyst/programmers, natural resource managers, database administrators, as well as many others. Development of a job series for the GIS professional will clarify the responsibilities of the GIS professional as it pertains to the new standards being set and allow for recognition of the skills and experience required in this profession. In addition, a job class series provides recognition to those individuals with specific skills, facilitates recruitment of qualified candidates, and increases the likelihood of retaining skilled individuals.

The GIAC may consider working to create the following job series:

- A GIS Technician series for those individuals whose primary responsibility is to create and maintain GIS data.

- A GIS Analyst series for those whose primary responsibility is to use GIS data and tools to provide products such as a maps, datasets or simply an answer to a question such as "how many acres of national park land border native allotments?" A GIS Analyst would also be able to perform some minor programming tasks to affect some result and participate in meetings dealing with standards, protocols, and data.

The GIAC will promote the ability for government agencies to recruit and retain staff necessary for GIS analysis, data management and application development through proper classification of staff, promotion of necessary training, and competitive funding.

Coordination

The GIAC can provide a forum and focal point for discussions regarding standards, policies and procedures designed to increase efficiency, reduce duplication of effort, and maximize our state resources. Topics for discussion follow.

Coordinator

Asking folks to participate is one thing, while getting them to actually do it may be another. All of the GIAC members have full-time obligations already. Hiring a GIS coordinator would help facilitate the multiple and somewhat involved tasks in this strategic plan. In addition a coordinator could facilitate the exchange of ideas and information, develop a comprehensive understanding of overall needs of the State and provide a more comprehensive picture to the GIAC and the AGDC.

Centralized and Decentralized Functions

"Everyone wants to be the coordinator; no one wants to be coordinated." – Nancy Tosta, former Staff Director of the Federal Geographic Data Committee

There still needs to be flexibility within each of the Departments to do as they see fit. Some functions may benefit from being centralized within a department, while others are more logically decentralized in the specific divisions. An advantage to some centralized functions is certain basic tasks are done once and consistently. (For example, a point of contact for public access.) Then everyone benefits from this effort. An advantage to decentralized functions is GIS capabilities are "in the field" and more readily available when interacting with users. A hybrid of these two approaches would be ideal. Common concerns about centralized functions are being told what to do/being too restrictive or having a slower response time. Common concerns regarding decentralized functions are the user can do whatever he or she wants, and is not held accountable. These concerns need to be addressed to ensure the most benefit.

How a Department chooses to implement standards, protocols, or application development may vary. Helping agencies meet these goals is the responsibility of the GIAC.

Software Administration:

As mentioned, many of the state agencies use ESRI products. One of the administrative tasks should be to research how licensing could be more efficiently managed and what additional benefits could be added. Licensing of other products such as digital orthophotos, satellite images, etc. may also be considered.

Free or Fees:

Whether or not the state should charge for data is inconsistent between Departments. Each department has its own rules, fee scales, and enforcement. Setting fees, collecting fees, and later distributing data can "hold up progress" and be more administrative trouble than it's worth. Federal agencies often freely redistribute data they have purchased, negating the charge. Funding to take the steps needed to make data accessible (i.e., clean it up, document it, post it on the web or create a CD, keep it current, provide it in various formats to be readable) is currently not available. Some data is very simple and ought to be free. Other

data is more complex, requires constant updating, and may need to be fee based to recoup costs. Guidelines on which types of data fall into what category may be a topic for discussion as well as whether consistency among state agencies is necessary and desirable.

Communication

How GIS can benefit the state is still unclear to many government decision-makers. A strategy for informing others of the benefits of geographic information could include:

- Wider distribution of announcements of upcoming conferences and presentations
- Involvement in the presentations at these conferences
- Inclusion of what is being done in Department newsletters
- A "Show and Tell" of state projects during GIS Day

GIAC Website

Decisions made by the GIAC, minutes from the meetings, meeting announcements and list of members should be posted on a website associated with the TIC website.

Action Items

- Clarify areas in which the GIAC can contribute to agency success in meeting Strategic Plan Goals and Objectives.
- Develop a job series for the GIS professional
- Work to develop state guidelines and standards for data access particularly with regard to fees
- Establish a GIAC website to provide a focal point for GIS activities within state agencies.

A Practical View

North! To the Future!

Following are two illustrations. The first illustrates how we do business now. When a project leader decides he needs information from all the agencies, he visits all the agencies and asks them what they have. Those agencies provide what data they have at that particular time. There is no investment to the agency, so the agency feels no obligation to tell the project leader of updates. It would be too unruly to do so for every project. Likewise, it is too time consuming for the project leader to ask every agency for new data on any kind of regular basis.

The project leader takes all this data, then manipulates it to do what he wants for his project and application. Now it is truly unruly to update! The application, map or other product gets published, but never updated.

Other project leaders take this compiled information from the project leader (after all this person has already done the groundwork), and develops another application. By this time, the data is getting quite outdated and the lineage of the data is getting lost.

The second illustration is how we would like to do business. Each agency provides their data to a clearinghouse. (With the development of the Open GIS, each agency will be able to hold the data on their own server, keeping it in a consistent location.) The project leader has "one-stop-shopping" for data and can monitor the dates of data. Ideally, each agency would provide data using a content standard or provide it with some consistency. The project leader can access what they need without interrupting agency staff or lengthy "workshop" meetings.

Illustration 1: How data is collected now for applications.

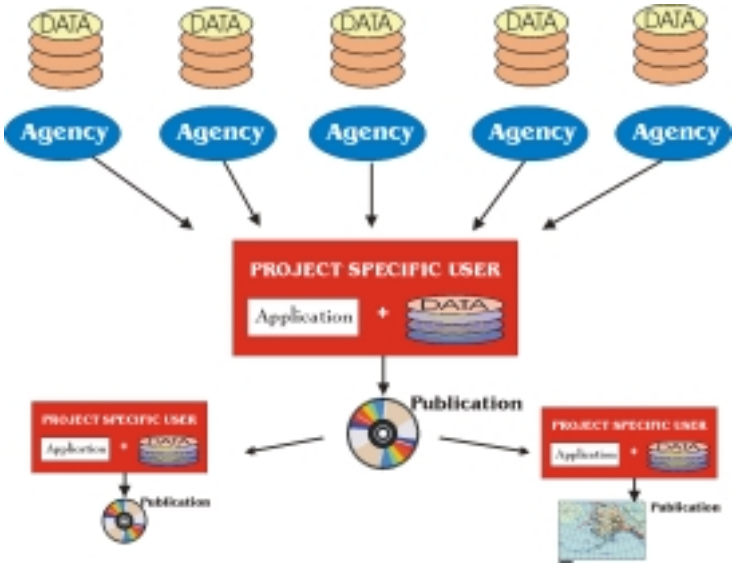
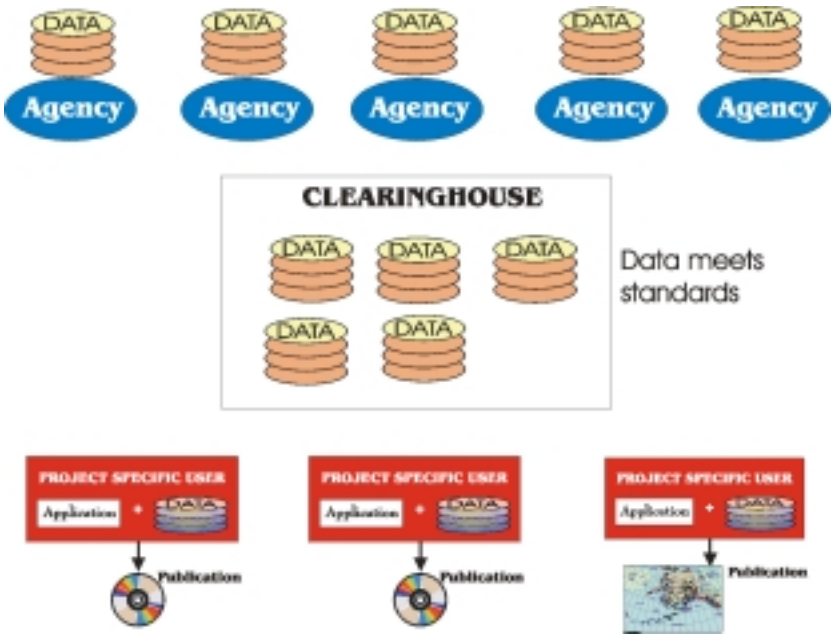


Illustration 2: How data should be distributed (to take advantage of new technology).



Conclusion

The compass for Alaska

The GIAC Strategic Plan provides a guideline of the initial steps toward improving quality, compatibility and online accessibility to state government spatial information. As the state reaches the goals outlined and as information and technology improves, users' needs will also change. Therefore, this document should not be viewed as static. It should be reviewed on an annual basis and updated as needed.